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of this hypothesis opens a new branch of the subject. Already, however, a positive step appears to have been made by *demonstrating* that in solids and liquids each molecule is acted on to a finite extent by those in its immediate neighbourhood.

Sir William R. Hamilton read a paper, "On some Transformations of Diverging Lines."

A collection of twenty-five ancient articles, consisting of bronze pins of several forms, the axis of a spinning bobbin, and two needles, all found near Gweedore, county of Donegal, were presented.

MONDAY, APRIL 26, 1858.

JAMES HENTHORN TODD, D. D., President, in the Chair.

J. BEETE JUKES, Esq., read a paper "On the Lower Palæozoic Rocks of the South-East of Ireland and their associated Igneous Rocks."

Rev. Professor Haughton read a paper on the same subject, and described certain minerals as abounding in these rocks, which had been hitherto unnoticed in common granites of Ireland.

The Secretary read a letter from the Chairman of the Local Committee at Baltimore, inviting the Members of the Academy to attend a Meeting of the American Association for the Advancement of Science, to be held in that city.

George V. Du Noyer, Esq., presented a series of drawings of antiquities, made by himself, from bronze and iron antiquities in the Museum at Rouen, in September last.

Fleetwood Churohill, M. D., on the part of Dr. Lockhart, presented five porcelain seals, collected by that gentleman during his residence in China. Two of them have inscriptions exactly the same as the seals Nos. 2 and 51 engraved in the late Mr. Getty's work on Chinese Seals found in Ireland.

The Secretary announced the presentation of a medal by the Royal Norwegian University of Christiania, struck in honour of Dr. Christopher Hansteen having completed a term of fifty years as Professor of Astronomy in that University.

MONDAY, MAY 10, 1858.

JAMES HENTHORN TODD, D. D., President, in the Chair.

REV. CHARLES GRAVES, D. D., read a paper "On a System of Imaginaries analogous to those employed by Sir William R. Hamilton in his Calculus of Quaternions."

The PRESIDENT read the following paper—

R. I. ACAD. PROC.—VOL. VII.

II

ON THE CONTENTS OF CERTAIN ANCIENT TOMBS IN THE NEIGHBOURHOOD OF
ANET, IN SWITZERLAND.

I MENTIONED to the Academy on a former occasion that I had received a letter from M. le Baron de Bonstetten, of Berne, making some inquiries respecting the earthenware pipes, several specimens of which are preserved in our Museum. My answer to him was, that I could not regard these pipes as more ancient than the sixteenth century, and, consequently, that the idea of supposing them in any way connected with the Celtic race was wholly untenable.

The Baron has since been kind enough to send me an account of the opening of some ancient tombs at Anet, near Berne, in Switzerland, which is of considerable interest, as tending to establish some fundamental principles of archæological investigation.

First, however, let me say that the Baron has fallen into the very common error of supposing that the small wedge-like hatchets, commonly called *Celts*, are peculiar to the Keltic race. The name *Celt* ordinarily given to them has propagated this error; but that word is only the Latin *Celtes*, or *Celtis* (from *cælare*, to carve or engrave), which occurs in the Latin Vulgate, Job, xix. 24:—"Quis mihi det ut [sermones mei] exarentur in libro stylo ferreo, et plumbi lamina vel *Celte* sculpantur in silice?" But the name of the Keltic family of nations, in its correct orthography, is wholly different, *Ῥαιωνελ*, *Γαλαται*, *Gadelii*.

Thus M. de Bonstetten records it as a fact which he appears to think inconsistent with his own very just conclusion of the non-Celtic origin of the tombs, of which I shall speak presently, that M. Müller, of Nidau, in the year 1848, opened a tomb on the hill of *Jolimont*, near Anet, in which were found a small bronze figure, "dont la costume bizarre n'a rien de romain;" a stone hammer, "et une de ces haches, ou coins en bronze commencement appelés haches celtiques." If continental antiquaries call these implements "haches celtiques," it is evident that they have fallen into the error of imagining that the name *Celt* (i. e. *Celtes*, a chisel) is connected with the Celtic, or more properly Keltic, family of the human race.

The opinion of M. de Bonstetten, in which I entirely concur, is, that the tombs opened by him in the neighbourhood of Anet are to be assigned to a period subsequent to the introduction of Christianity into that country, that is, subsequent to the latter part of the sixth century; and I am inclined to believe them, for the reasons I shall give presently, very much later.

The real importance of the Baron de Bonstetten's discoveries, in reference to the science of Archæology, does not appear to have been fully perceived by himself. But I shall be better able to explain what I

* It is curious that some MSS. and printed editions of the Vulgate (as that of Rob. Stephanus, Paris. 1528) have "vel certe sculpantur," a reading which is, no doubt, the true one, as being in accordance with the LXX. and with the Hebrew.

mean when I have given you a short account of the results of his investigations.

He found among the ruins of the ancient Chateau of Fœnis, about a league to the north of the village of Anet, near Berne, ten large tumuli, erected upon a wooded hill which overlooks Anet, and from which there is a view of the lakes of Morat, Neuchatel, Bienne, and of the chain of mountains from the Titlis to Mont Blanc. Six of these mounds were ranged at some feet from each other, on the crest of the hill, in a line running from east to west. The remaining four formed a semicircle at the end of this line. The mounds varied in dimensions from 6 to 15 feet in height, and 40 to 60 paces in circumference.

The first circumstance noticed by the Baron, which distinguishes these tombs from the Celtic and British sepulchral monuments of the same kind is, that the stones forming the chamber of the tomb appeared to have been cemented together with mortar.

Another circumstance is, that some of these tombs contained two or three bodies, not laid together in the same chamber, as in our Celtic tombs, but in a lower, middle, and upper chamber, separated from each other by layers of stones or flags, the roof of the lowest chamber forming the bottom of the second, and so on. M. de Bonstetten remarks that he did not find in any case more than three such chambers, and that in the upper chamber were usually found, in addition to the remains of the third corpse, the ashes of burnt bones, on a bed of fine sand. The whole structure was surrounded and covered with small stones, giving the monument the form of a conical mound, resembling our cairns.

It is probable, from this account, that two different customs of sepulture may have coexisted at the time when these tumuli were constructed,—that of cremation, and that of burial, properly so called,—and that the burnt remains were in general placed at the top. Could it be that the Christians, in reverence for the hope of the Resurrection, were buried without cremation, and that the heathen serfs, or *pagani*, were burnt?

In confirmation of this opinion, it is to be observed that there were found in the same tomb articles which had evidently been subjected to the action of fire, and other articles which, from their very nature, could not have been in fire. Thus, in the first tomb, M. de Bonstetten found “bracelets de bronze, presque consumées par le feu,” and also a wooden ring, a large ring of amber, and rings of bronze connected together by linen or worsted threads, the remains of which were visible, forming a sort of light coat of mail, intended evidently for ornament rather than for defence. In other tombs he found the remains of chariots in wood, a buckler, with the remains of the leather of which it was composed, rings of wood and of amber, leather harness, and other things which evidently could never have been subjected to the action of fire.

But it will be better to describe very briefly what was actually found in these tombs before we make any general remarks on their contents.

TOMB I.—After digging seven feet, large flags were found, covered with a black paste-like substance (probably decayed animal matter), mixed with fragments of bones, whether human or animal M. de Bonstetten does not inform us. At the northern side were found fragments

of rings or bracelets of hollow bronze, which, as already remarked, were almost wholly consumed by fire, a wooden ring, and a large ring of amber, resting on a layer of gray dust; also, as above mentioned, the remains of a garment of linen or coarse stuff, ornamented with small rings of bronze, similar to those used in coats of chain-armour. At the east end of the tomb were found the remains of an armlet of hard wood, covered with a black varnish, and the remains of a bronze plate, which appeared to have been originally fastened upon leather, and seemed to have formed part of the breast-plate of a coat of armour. It was delicately engraved, in zig-zag lines, forming elliptic and semi-elliptic ornaments, and it had still two rings, intended apparently for fixing it upon the shoulder. Some fragments of pottery were also observed.

It would seem, therefore, that this was a tomb the occupant of which had been interred by cremation, the burnt remains having been deposited in urns of pottery along with the unburnt armour of the deceased; and these deposits having been covered with flags, the remains of some other bodies, which seem to have been also burned, were spread on the top. The existence of wood and leather seems incompatible with a very high antiquity.

TOMB II.—At a depth of four feet were found two rings of bronze, covered with a fine rust, and, one foot lower, a fibula; one foot lower still, or six feet from the surface, an iron hook, apparently the remains of a spur; and a small ring of iron; together with fragments of pottery and large iron circles, with nails and wood inside, which M. de Bonstetten supposes to have been the remains of the wheels of a chariot.

TOMB III.—This tomb was only six feet in length and forty paces in circumference. At a depth of two and a half feet were found two bronze armlets, two bracelets, a bronze band or collar for the neck, which M. de Bonstetten supposes to have been a female ornament, and other fragments of bronze, engraved in relief or stamped.

The collar was a thin plate or flexible lamina of bronze, with the hooks or fastenings still remaining which held it at the back when placed round the neck. It is ornamented in the same style of zig-zag which has already been noticed on the breast-plate found in Tomb I., the zig-zag lines being disposed in semicircles, right lines, and triangles.

The armlets are of a kind not found, so far as I know, in any Celtic monuments: they are hollow cylinders of bronze, intended apparently to cover the arm from the wrist to within an inch or two of the elbow-joint, and the bronze appears to have been fastened to an internal cylinder of wood, at least in the case of one of them, of which one-half was perfect, and which contained a small bracelet (I presume in bronze, although M. de Bonstetten does not say so), and the remains of a wooden handle, which M. de Bonstetten supposes to have been part of a distaff.

On reaching the level of the ground, M. de Bonstetten perceived that in the centre of the tumulus the earth had been moved, and on digging down he found the flags of a second tomb, on which lay the umbo of a shield. It was ornamented with concentric circles of bronze, engraved in chevrons, and fastened round the umbo by thongs of leather, passing through the triangular ornaments of the bronze circles, and sewing them

to the body of the shield, which seems to have been also of leather, from the fatty and black paste-like substance with which the flags were covered. There were also found, along with the remains of the shield, a small buckle, a bracelet (of bronze, I suppose), a thick armlet of wood, not varnished, as some of the other wooden articles were, and a ring of amber.

TOMB IV. contained only some remains of bones, and a piece of oxidized iron.

TOMB V.—At two feet from the summit was found a layer of sand and burnt bones; two feet lower, in another layer of sand, towards the N. W. side of the tumulus, were fragments of coarse pottery, mixed with pieces of charcoal and bones, the remains of a bracelet of wood, covered with thin bronze, three smaller bracelets in bronze, a clasp (bronze) of delicate workmanship, large fragments of narrow bands of bronze, ornamented in relief, intended as ornaments of the head, or, perhaps, stitched upon a garment, and three buttons much corroded, which were found buried in a gray dust, the remains, as M. de Bonstetten conjectured, of some kind of stuff or cloth garment.

Under the second layer of sand were found the stones of a third sepulchre, which contained bronze armlets, much broken, a bracelet of elastic wire, and a ring of bronze; also a large ring of amber, too large for the finger, but too small to have been worn on the arm or wrist, and a great number of small, thin plates of bronze, resembling the scales of a fish, lying together in a brown substance, which damp had reduced to a sort of paste, and which was probably the remains of cloth, on which they had been stitched, to form a light coat of mail.

TOMB VI.—This tumulus was higher than any of the rest. It contained, at two feet from the top, a broken urn (clay), full of ashes; a foot lower was a bed of cement, formed of stones and sand, which increased in thickness towards the centre of the tomb. In it were found, placed so that the lines joining their centres would have formed a rectangle, four circles of iron, twenty-three inches diameter, with nails which had evidently fastened them to wood. One of these was broken, but the other three were entire. Near each of these iron circles was an iron round plate, one inch broad, and four in diameter, which had been fastened upon wood with nails, and had a rim or flange on its outer circumference of about three inches. From these remains—the position of the four iron circles, and the fragments of wood still adhering to them, the number of nails, fragments of rings and of iron plates found surrounding them—M. de Bonstetten concluded that this tumulus had contained a chariot, with four wheels, which had been buried with the corpse or ashes of its owner. Between the wheels of this chariot he found also a human thigh-bone, and an iron sword, fifteen inches long, in a sheath of bronze.

Having dug through the thick crust of cement which formed the floor of the first chamber, he came upon an immense mass of stones, of all shapes and sizes, piled upon each other. At a depth of twelve feet from the top of the tumulus were found large flags, on which were a prodigious quantity of remains of leather, wood, iron, and bronze, and circles of iron, or wheels, similar to those found in the upper chamber. Here

M. de Bonstetten found large fragments of leather harness, ornamented with copper nails arranged in squares and triangles; a piece of wood, ornamented in the same way; several rosettes or buttons of bronze fixed to thongs of leather; an iron horse-bit; a horse's breastplate in bronze; and a plate of bronze in the form of a crescent. Further on were found large remains of an ornamental grating or trellis-work in bronze, which had evidently been fastened upon wood with nails, and was strengthened round the edge with bars of iron; more than twenty cones of wood, which was found to be hazle, covered with thin bronze, were also discovered; these M. de Bonstetten supposes to have been the spokes of the wheels, and the bronze trellis-work to have been the ornaments of the body of a chariot.

Fragments of a human skull, with the jaw-bone, were also found, together with two sword handles; a chain of gold in filigree work; a bead or runner of solid gold, about half an inch in diameter, the surface of which was highly ornamented in relief.

All these objects were found under large stones placed upon the flags at regular intervals, leading to the conclusion that the chariot had been taken to pieces, and its several parts, with the other articles, laid out upon the flags.

In this tumulus was also found a piece of flint, cut like the flint of a gun-lock, which M. de Bonstetten supposes to have been an amulet; also a triangular, irregular, fragment of stone, three feet wide by two high, which was found built into the side walls of the chamber, and seemed like a fragment of some larger stone, the surface of which had evidently been cut by human art. The position of this fragment in the wall was purely accidental; two lines crossing at right angles traversed the surface of the stone, and within the angles thus formed were several circular holes of different sizes, and of about half an inch deep. M. de Bonstetten seems disposed to believe that this stone had some connexion with the ancient paganism of the country, and that its having been broken and used as the material for ordinary building is an evidence that at the period when this tumulus was erected, Christianity had already undermined the ancient superstitions.

TOMB VII. contained nothing but an iron ring or bracelet. It had an enclosure of stones on the south side only, and was much smaller than the preceding.

TOMB VIII.—After penetrating a covering of mortar mixed with clay, at a depth of five feet lower, there was found a large vessel of thin bronze, without ornament, three feet high. The diameter of the mouth was three feet, that of the base one foot four inches. It stood in a second bottom of wood, with a large rim outside, much decayed. The earth in which this vessel was embedded was so hard, and adhered to it so strongly, that the vessel was much broken in the attempt to get it out; it was filled with gray dust and fragments of cloth, which adhered to its sides. Near the vessel was found a small plain gold ring, apparently part of an ear-ring; also a collar or neck-lace formed of hollow balls of thin gold, which had been on a string; each ball something more than an inch in diameter, but all of them much battered and bruised; also

the remains of a crown or diadem of thin gold, with some fragments of a human skull. This diadem was ornamented by a stamp impressed on the inside, rendering the ornament concave inside, and raised in relief outside; the ornament consisted of concentric circles, composed alternately of small squares, circles, and triangles, with lines between. M. de Bonstetten supposes the form of this diadem to be that of a cap or bonnet, resembling the crowns to be seen on the statues of the Merovingian kings on the portico of the church of St. Denis. The outer edge was turned back on itself, forming a border of about half an inch, ornamented with fine crossing lines. Remains of a thin plate of bronze were found adhering to the inside in several places, evidently an internal lining for strength. Near this was discovered a brooch of hollow bronze, and two large rings, arm-rings apparently, of wood. Two chariot wheels, of which the iron shoeing only remained, were placed upright on each side of the bronze vessel already described; large fragments of the timber of which they were composed were found all around. At a foot lower were found the flags forming the roof of a lower sepulchral chamber. In this were a wooden armlet, a buckle, a bronze bracelet, of somewhat elaborate construction, and fastened with a hook and eye; the umbo of a shield, fastened by thongs of leather to circles of bronze, exactly the same as the umbo found in Tomb III. The leather crumbled into dust on exposure to the air.

TOMB IX.—On the top of this tumulus was a circular sunken space, about a foot deep, and seven in diameter. The interior of the tumulus consisted of a circular wall of stones, about from three to four feet high; the centre was filled with earth and lime, forming a cement so hard that it was broken with great difficulty. The Baron found here only charcoal, and two pieces of iron, which seemed the remains of a hook.

From this circumstance he concludes that a tumulus of this construction was intended only for the reception of the bodies of serfs, or the lower orders; whilst the tombs of kings or nobles were constructed altogether of stones and flags, the quantity of stones piled up upon the cairn being proportional to the rank of the deceased.

TOMB X.—A large beech tree grew on the top of this mound, which rendered it necessary to open it at the side. After removing a large upright triangular stone of flint, large horizontal flags were discovered, on which lay two great armlets, of the same kind as those formerly described, both of wood, but broken and decayed; two bronze rings or bracelets for the wrist, and one, also in bronze, of the spiral form, being a bronze wire twisted several times in a spiral round the arm; a fragment of a bronze plate, with engraved ornamentation, a wooden ring, and a plate of bronze, bearing in relief a Greek cross. The existence of this ornament, worn probably on the breast or round the neck, seems to prove that this, and the other tombs of similar contents and construction, are to be assigned to the Christian period.

It remains now to make some general remarks on these ancient sepulchres.

There can be very little doubt that the steel sword, with its bronze scabbard; the gold chain of filigree work, and the gold bead, which

seems to have belonged to it, were of Roman manufacture. Many similar articles are to be found in the museums of Italy. The chariot of four wheels, ornamented with bronze trellis-work, is also most probably Roman, and M. de Bonstetten shows that it was a Roman custom to bury or burn shields, armour, chariots and harness, with the bodies of the illustrious dead: so Virgil—

“Hinc alii spolia occisis derepta Latinis
Conjiciunt igni, galeas, ensesque decoros,
Frenaque, ferventesque rotas.”—*Æn.*, lib. xi.

On the other hand, the “brassards,” as M. de Bonstetten terms them, i. e. armlets, or arm protectors, of wood and bronze, the bronze collar, the diadem of gold, the necklace of hollow golden balls, and the rings of amber, are evidently not Roman: nor do these tombs seem to have contained anything decidedly and unquestionably Celtic.

The Baron de Bonstetten is, therefore, I think, fully justified in the conclusion that these tumuli are not of a high antiquity: the Greek cross found in Tomb X. shows them to have been subsequent to Christianity; their contents indicate a period of transition from the old civilization of the Roman Empire, to the rude and more barbarous manners of the feudal ages. He infers then that the Helveto or Gallo-Romans, are the only people to whom we can attribute the tumuli of Anet.

But a still more important conclusion he has omitted to draw from an examination of the contents of these sepulchres. It is evident that they at once refute the attractive theory of the Danish and some German antiquaries, of a Stone, a Bronze, and an Iron period. In these tombs we find wood, iron, and bronze together. We find even protective armour for the body, of all these materials: and M. de Bonstetten mentions in one instance a flint, which he supposes to have been an amulet, but which was more probably one of those flint, spear, or arrow-heads so commonly found in Ireland. It is evident, therefore, that there is great danger of our being led to distort or falsify historical facts, if we suppose the existence of a chronological period defined by the use of stone, another by the use of bronze, and a third by the use of iron. On this subject, however, I would refer you to the able remarks made in this room by the late lamented John Mitchell Kemble, little more than a year ago, which have been printed in our Proceedings, and which I caused also to be printed in a separate form. In that able paper, the last production, alas! of its accomplished author, you will find also some valuable remarks on the subject of ornamentation as a characteristic of race. The ornamentation of the articles found in the tumuli of Anet is all evidently of the same character, and strongly confirms the conclusion arrived at by M. de Bonstetten of their belonging to the Helveto or Gallo-Roman race. But I have already occupied so much time, that I must forbear making any further remarks on this subject, and I shall, therefore, content myself with observing only that the Greek or Pelasgic people of Italy have left behind them bronze articles, with the same ornaments of alternate rows, composed of serrated lines, of circles, of lozenges, and of triangles, which form almost the exclusive style of ornament on the bronze remains found in the tombs of Anet, and that the same combi-

nation of the serrated zig-zag with the circle, triangle, and other geometrical figures, seems to have been characteristic of the Teutonic or Germanic tribes.

It is to be regretted that M. de Bonstetten has not more minutely described the pottery found by him in these tombs. He mentions it only in general terms; and does not say whether it exhibited any or what kind of ornamentation; nor does he tell us whether the fragments disinterred by him were the ruins of sepulchral urns, or articles for culinary or domestic use. It is most probable, therefore, that they were of the latter class, for it is scarcely to be supposed that if they had been of the nature of our clay sepulchral urns, of which so many specimens are preserved in your Museum, so accomplished an antiquary would have passed them over without notice.

The following heel-ball rubbings, made by Captain W. Persse Newenham, R. N., were presented by that gentleman to the Academy:—

Nos. 1, 2, 3, and 4, from brasses in St. Mary's Redcliff Church, Bristol.

Nos. 5 and 6, from brasses in the Temple Church, Bristol.

No. 7, from a brass in Swainswick Church, Bath.

No. 8, from a brass in the Abbey Church, Bath.

Nos. 9 and 10, from Turkish tombs brought from the Crimea.

Nos. 11 and 12, from sculptured stones found in a by-street in Alexandria.

Also, copies of inscriptions from a temple built by Psamitik II. (the Psammis of Herodotus), who reigned six years (from 597 or 596 to 591 or 590, B. C.). The king is represented making offerings to different deities.

MONDAY, MAY 24, 1858.

JAMES HENTHORN TODD, D. D., President, in the Chair.

ON the recommendation of the Council, it was—

RESOLVED, That the sum of £50 be placed at the disposal of the Committee of Antiquities, for the purpose of purchasing articles for the Museum.

His Excellency the Lord Lieutenant having arrived,—

The PRESIDENT delivered the following Address:—

MY LORDS AND GENTLEMEN,—The Council have imposed upon me the grateful task of announcing to you their recent award of the Cunningham Medals, and of explaining to you the grounds upon which they have adjudged them to the four gentlemen to whom I am commissioned to deliver them at this meeting; but I must, in the first instance, return thanks to his Excellency the Lord Lieutenant, who has most kindly consented to give additional honour to the distinction conferred upon those gentlemen by his presence on this occasion.

R. I. ACAD. PROC.—VOL. VII.

I